REMARKS

Claims 1-20, all the claims pending in the application, stand rejected. Because of substantial differences between the claimed invention and the prior art, as subsequently described, no claims have been amended. Moreover, new claims 21-36 have been added. Limitations for the thickness of the phosphor layer as described in those claims are supported in Fig. 4 as originally filed.

Claim Rejections - 35 U.S.C. § 102

Claims 1 and 15 are rejected under 35 U.S.C. § 102(b) as being anticipated by Cupolo III (5,666,174). This rejection is traversed for at least the following reasons.

Claims 1 and 15

With reference to Figs. 1 and 2 for explanation but without limitation, claim 1 is directed to a light source unit 40 (comprising an LED, mercury arc lamp or fluorescent lamp) that generates excitation light having a predetermined wavelength (e.g., UV - 360 nm - 380 nm; violet or deep blue - 380 nm - 420 nm). The display apparatus also has an optical element 50 for modulating the excitation light generated by the light source unit for each of pixels in a two-dimensional plane. Finally, the display unit has a fluorescent screen 60, comprising a substrate 70 and a phosphor layer 80 formed over the substrate.

The layer of phosphor has an absorption coefficient not smaller than 1 x 102 cm-1 for the excitation light. As explained beginning at page 14, the absorption coefficient refers to an apparent absorption coefficient that is selected in order to secure a sufficient brightness and excellent sharpness, as further explained through page 19, line 12.

The Examiner admits that absorption coefficient of the phosphor layer is not specifically disclosed. The Examiner takes the position that the absorption coefficient of the phosphor layer is inherent "since some of the same phosphors are disclosed." The Examiner's conclusion is erroneous in at least two respects.

First, with regard to the law of inherency, the courts have held that a feature is inherent only if it necessarily follows from a disclosed structure. The CAFC has held recently that inherent anticipation requires that the missing descriptive material is "necessarily present," not merely probably or possibly present, in the prior art. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citing *Continental Can Co. USA, Inc. v. Monsanto Co.*,

948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)). In other words, if alternatives are possible, inherency is precluded. In the present case, there are alternatives which preclude a conclusion of inherency.

Second, the Examiner's conclusion of inherency appears to be based on the assumption that a given phosphor will necessarily determined a single absorption coefficient. However, the claim is directed to a "layer of phosphor". That phrase does not include a phosphor material alone. As explained at page 12, line 18, the phosphor layer 80 is made by dispensing the phosphor particles in an acrylic resin binder dissolved with an organic solvent, in one exemplary embodiment. Other ways of making the phosphor films are further disclosed. What is clear is that the phosphor layer comprises more than simply phosphor particles.

Further, the application expressly teaches at page 19, line 25-page 20, line 10 that "the apparent absorption coefficient and the optimum thickness cannot be decided according to only the kind of phosphor because they change according to the binder ratio, the particle size and so on." Clearly, the "phosphor layer" is affected by many different parameters. The application discloses how such parameters may be adjusted to obtain an optimum result according to the invention of the Applicants. As disclosed at col. 20, lines 11-15, Applicants have taught that by using the phosphor layer having an absorption coefficient within a predetermined range, which is well supported by Applicants' experimentation and innovation, the excitation light can be absorbed sufficiently in a phosphor layer of a particular thickness that results in an image high precision and high brightness. Nothing in Cupolo III or any other prior art teaches or suggests this result.

Indeed, even if the same phosphors are disclosed in Cupolo, III , an absorption coefficient changes for several reasons. In the case where inert ions are concerned with absorption of excitation light, absorption degree of the phosphor itself changes depending on concentration of the inert ions. As to Y_2O_3:Eu, ZnS:Ag, ZnS:Cu, Al which are described in Cupolo, III at column 6, lines 58-60, excitation of those phosphors by using near-ultraviolet (UV) light falls under that case where the inert ions are concerned with absorption of the excitation light. In such case, even if the same phosphors are used, the absorption degree of the phosphor itself changes in a wide range.

Accordingly, this rejection of claim 1 is overcome. Claim 15, which depends from claim 1, is similarly patentable.

Claim Rejections - 35 U.S.C. § 103

Claims 2, 3, 8, 11 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,66,174) in view of Janning (6,147,456). This rejection is traversed for at least the following reasons.

Claims 2 and 11

Independent claim 2 and dependent claim 11 are similar to claim 1 in that they are directed to a display apparatus having a light source, optical element and fluorescent screen. Claim 2 does not contain the limitation to an "absorption coefficient" but states that the thickness of the layer of phosphor that given a maximum brightness caused by the excitation light is not larger than 120 microns. The importance of this limitation in achieving excellent sharpness and brightness is explained at pages 13-19, with reference to Fig. 4. From this disclosure it is clear that the thickness that provides a maximum brightness is approximately 120 microns or less, and preferably 80 microns or less.

In framing the rejection, the Examiner admits that Cupolo III does not disclose a thickness of the layer of phosphor that gives a maximum brightness caused by the excitation light, particularly a thickness not larger than 80 microns. The Examiner looks to Janning for disclosure at col. 9, lines 25-30 of a light emitting layer having a thickness of 1200 angstroms and concludes that it would have been obvious for one skilled in the art to modify Cupolo III in view of Janning.

The flaw in the Examiner's analysis is that Janning has nothing to do with the type of display disclosed in Cupolo or the present invention, a the excitation particles and the source thereof are different. Specifically, on careful review of Janning, particularly Fig. 2, the source of energy for the disclose is a cathode emitter 36, not a "light source unit," that produces electrons 33, rather than light. The light emitting layer 40 in Janning would necessarily be thinner than that of a light-type device. Given the significant differences in stimulating particles (electron v. photon) and energy levels, nothing in Janning would teach or suggest a particular thickness of phosphor layer for the light type device of Cupolo III. In this regard, Janning is directed to a field emission display (FED) and is explained at col. 3, line 33, the emissions are excited from

the phosphors by electron bombardment. Nothing in the reference teaches or suggests that the structures or composition of the FED devices may be applicable to a light stimulating device. Accordingly, this rejection must fail.

Claims 3, 8 and 13

These claims focus on a display apparatus where a product of the absorption coefficient for the excitation light and thickness of the layer of phosphor is within a range from 1-8. In short, this claim relies on a combination of the features of claims 1 and 2.

The Examiner admits that Cupolo III does not teach a product of an absorption coefficient for the excitation light and the thickness of the layer being within a range from 2-4. The Examiner concludes it would have been obvious to modify Cupolo on the basis of the teachings in Janning.

For the reasons given with regard to both claims 1 and 2, there is no teaching or suggestion of either absorption coefficient or thickness in either reference. Accordingly, this rejection should be overcome.

As to claim 3, as described in Tanning at column 9, lines 25-26, the light emitting layer preferably has a thickness on the order of about 1200 Angstroms. Since 1200 Angstroms correspond to 0.12 μm, a product of an absorption coefficient for the excitation light and a thickness of the phosphor layer would become smaller than the claimed range by one or more order. Thus, it would not have been obvious to one of ordinary skill in the art to disclose that a product of an absorption coefficient for the excitation light and a thickness of the phosphor layer is within a range from 2 to 4 or a range from 1 to 8.

Claim 4 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) and further in view of Davey (6,104,456). This rejection is traversed for at least the following reasons.

This claim is directed to a display apparatus, but further adds the limitation to a projection lens to project an excitation light modulated by the optical element and requires a layer of phosphor having an absorption coefficient not smaller than 1 x 102 cm-1 for the excitation light as in claim 1. The Examiner admits that Cupolo does not disclose a projection lens to project the excitation light modulated by the optical element. Thus, he turns to Davey for such teaching with regard to a projection lens 3. However, this combination does not remedy the

deficiencies of Cupolo and, thus, for the reasons given for claim 1, this rejection should be overcome.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) as applied to claim 1 and further in view of Janning (6,147,456). This rejection is traversed for at least the following reasons.

Claim 7 depends from claim 1 and will be patentable for the reasons given with regard to claim 1. Janning is incompatible with Cupolo, as asserted with regard to claim 2. Accordingly, this rejection should be overcome.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) and Davey (6,104,456) as applied to claim 4 and further in view of Janning (6,147,456). This rejection is traversed for at least the following reasons.

Claim 9 will be patentable for the reasons given with regard to claim 4 and Janning does not remedy the deficiencies of this combination, as already explained with regard to claim 2. Janning's teachings of a display that uses electrons is wholly incompatible with a display that uses incident light.

Claims 17 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) as applied to claim 1 and further in view of Duggal et al (6,357,889). This rejection is traversed for at least the following reasons.

Claims 17 and 19 depend from claim 1 and would be patentable for the reasons given regarding to that claim. Specifically, Cupolo III does not teach the use of an absorption coefficient, as claimed, and such coefficient would not be obvious since nothing is taught in the reference with regard to such coefficient. Further, Duggal et al does not remedy this deficiency. Duggal is merely cited for the use of the second phosphor which differs from the first phosphor, but has no relevant teaching with regard to absorption coefficient, as claimed. Accordingly, this rejection should be overcome.

Claims 18 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) and Davey (6,104,456) as applied to claim 4 and further in view of Duggal et al (6,357,889). This rejection is traversed for at least the following reasons.

For the reasons given with regard to claims 17 and 19, this rejection should be overcome. None of Cupolo, Davey or Duggal provide the teachings necessary to remedy the basic deficiency of claim 1, that is the failure to teach the absorption coefficient as claimed.

Claims 5 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) and further in view of Janning (6,147,456) and Davey (6,104,456). This rejection is traversed for at least the following reasons.

Claim 5 is similar to claim 1, except that it adds a limitation to the use for projection to project the excitation light modulated by the optical element. This claim would be patentable for the reasons given with regard to claim 2. Further, as noted with regard to claim 4, there is no teaching or suggestion in Davey of a phosphor layer that is not larger than 120 microns, more particularly 80 microns. Further, as already noted, Janning is wholly incompatible with the teachings of Cupolo III and the present invention. Accordingly, this rejection should be overcome.

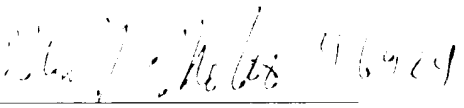
Claims 6, 10, 14 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cupolo III (5,666,174) and further in view of Davey (6,104,456) and Janning (6,147,456). This rejection is traversed for at least the following reasons.

Claim 6 and claims 10, 14 and 16 that depend therefrom, are substantially similar to claim 3, other than the further addition of a projection lens limitation. This rejection should be overcome for the reasons given with regard to claim 3. Davey does not remedy the deficiencies of the combination of Cupolo III and Janning because it does not teach an absorption layer or a thickness, as claimed for a light display device.

On the basis of all the foregoing arguments, Applicants respectfully submit that the rejections are overcome without any amendment to the claims. Accordingly, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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